Catalogue no. 82-003-X
ISSN 1209-1367

Health Reports

Hospitalization rates among economic immigrants to Canada

by Edward Ng, Claudia Sanmartin and Douglas G. Manuel

Release date: July 19, 2017

Statistics Canada Statistique Canada

Canada

How to obtain more information

For information about this product or the wide range of services and data available from Statistics Canada, visit our website, www.statcan.gc.ca.

You can also contact us by

email at STATCAN.infostats-infostats.STATCAN@canada.ca

telephone, from Monday to Friday, 8:30 a.m. to 4:30 p.m., at the following numbers:

- Statistical Information Service 1-800-263-1136
- National telecommunications device for the hearing impaired 1-800-363-7629
- Fax line 1-514-283-9350

Depository Services Program

- Inquiries line 1-800-635-7943
- Fax line 1-800-565-7757

Standards of service to the public

Statistics Canada is committed to serving its clients in a prompt, reliable and courteous manner. To this end, Statistics Canada has developed standards of service that its employees observe. To obtain a copy of these service standards, please contact Statistics Canada toll-free at 1-800-263-1136. The service standards are also published on www.statcan.gc.ca under "Contact us" > "Standards of service to the public."

Note of appreciation

Canada owes the success of its statistical system to a long-standing partnership between Statistics Canada, the citizens of Canada, its businesses, governments and other institutions. Accurate and timely statistical information could not be produced without their continued co-operation and goodwill.

Standard table symbols

The following symbols are used in Statistics Canada publications:

. not available for any reference period
.. not available for a specific reference period
... not applicable
0 true zero or a value rounded to zero
0[s] value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
[p] preliminary
[r] revised
x suppressed to meet the confidentiality requirements of the *Statistics Act*
[E] use with caution
F too unreliable to be published
* significantly different from reference category ($p < 0.05$)

Published by authority of the Minister responsible for Statistics Canada

© Minister of Industry, 2017

All rights reserved. Use of this publication is governed by the Statistics Canada Open Licence Agreement.

An HTML version **is also available.**

Cette publication est aussi disponible en français.

Hospitalization rates among economic immigrants to Canada

by Edward Ng, Claudia Sanmartin and Douglas G. Manuel

Abstract

Background: Economic immigrants generally, and economic class principal applicants (ECPAs) specifically, tend to have better health than other immigrants, as well as the Canadian-born population. However, health outcomes vary among subcategories within this group, especially by sex.

Methods: This study examines hospitalization rates among ECPAs aged 25 to 74 who arrived in Canada between 1980 and 2006 as skilled workers, business immigrants, or live-in caregivers. The analysis used two linked databases to estimate age-standardized hospitalization rates (ASHRs) overall and for leading causes by sex. ASHRs of ECPA subcategories were compared with each other and with those of the Canadian-born population. Logistic regression was used to derive odds ratios for hospitalization among ECPAs, by sex.

Results: Male and female ECPAs aged 25 to 74 had significantly lower all-cause ASHRs than did the Canadian-born population in the same age range. This pattern prevailed for each ECPA subcategory and for each disease examined. Compared with skilled workers, business immigrants had lower odds of hospitalization; live-in caregivers who arrived after 1992 had higher odds. Adjustment for education, official language proficiency, and world region reduced the strength of or eliminated these associations.

Interpretation: Compared with the Canadian-born population, ECPAs generally had lower hospitalization rates. Differences were apparent among ECPA subcategories.

Keywords: Business immigrants, data linkage, immigrant category, live-in caregivers, skilled workers

Health research recognizes that immigrants to Canada are not a homogeneous group and has revealed differences in outcomes by characteristics such as place of origin and period of arrival.[1,2] Owing to a lack of data, few studies have focused on health outcomes by immigrant category (family class, refugee, economic class), although it is an important dimension of immigrant research.[3,4] Family class immigrants and refugees are admitted for reunification and compassionate reasons. Economic class immigrants are selected based on a point system designed to assess their skills and potential contribution to the economy.[5]

With the development of new data sources, it has been possible to examine health outcomes for specific immigrant categories, notably, refugees, who are perceived to be the most vulnerable.[6,7] Less attention has been paid to economic class immigrants, although they constitute the majority of recent arrivals (55% in 2006, compared with 13% for refugees).[8] An exception was a study that linked landing file information to provincial administrative data and showed substantial heterogeneity within the economic class in their use of medical services. However, the results were preliminary and represented only two provinces—Manitoba and British Columbia.[9]

Economic immigrants comprise three subcategories: skilled workers, business immigrants, and live-in caregivers.[8] Skilled workers and business immigrants are selected for their ability to establish themselves in the labour market or through entrepreneurial activities. Under the Live-in Caregiver Program, temporary foreign workers are admitted to care for children, seniors, or people with disabilities in private households. Program participants may apply for permanent resident status within three years, upon completing two years as a live-in caregiver.[10]

When they arrive, immigrants tend to be in good health relative to the Canadian-born—a phenomenon known as the "healthy immigrant effect." The rate at which their health declines over time can vary.[1,11] For example, the financial investment required to be admitted as a business immigrant suggests that such individuals have considerable wealth. By contrast, qualitative studies have reported that live-in caregivers may face employment conditions that pose health challenges,[12-14] although little quantitative evidence is available to compare their health with that of business immigrants and skilled workers.

Because immigration applications are screened mainly through principal applicants, the present study focuses on this group, who constitute about 40% of the economic class.[8] With information from linked databases, hospitalization rates of economic class principal applicants (ECPAs) aged 25 to 74 were calculated by subcategory and sex, and compared with those of the Canadian-born population and between the subcategories.

Hospitalization is an imperfect health indicator, in that it does not capture less severe illnesses that do not warrant hospital admission. Nonetheless, hospital costs account for the largest share of Canada's health care spending (close to 30% of the total health expenditure of $219 billion in 2015).[15] It is, therefore, important to understand patterns of hospital use by groups such as immigrants.

Authors: Edward Ng (edward.ng@canada.ca), Claudia Sanmartin, and Douglas G. Manuel are with the Health Analysis Division at Statistics Canada, Ottawa, Ontario. Douglas G. Manuel is also with the Ottawa Hospital Research Institute and the Institute of Clinical and Evaluative Sciences.

Data and methods

Data sources

The Immigrant Landing File (ILF), a national database provided annually to Statistics Canada by Immigration, Refugees and Citizenship Canada (formerly Citizenship and Immigration Canada), is a census of immigrants who arrived since 1980. The ILF includes date of entry, source country, admission category (economic class, family class, refugee), and principal applicant status.[16] Landing records for 1980 through 2008 were used for linkage.

The Discharge Abstract Database (DAD) is a census of discharges from all public hospitals (excluding Quebec), which is provided to Statistics Canada by the Canadian Institute for Health Information.[17] It contains demographic, administrative, and clinical data for about 3 million discharges annually. Hospital discharges that occurred from 2006/2007 through 2008/2009 were used for linkage.

The ILF-DAD linkage was performed through deterministic exact matching with the 2006 Census as a "bridge" file.[18,19] Of 2.6 million eligible ILF records, 10% were linked to at least one DAD record between 2006/2007 and 2008/2009. Validation indicated that the linked ILF-DAD file is representative of recent immigrants residing in Canada in 2006 and their hospital experiences.[20] Details about the linkage are available elsewhere.[21,22]

The long-form census questionnaire is administered to 20% of the non-institutional population. Linked 2006 Census-DAD data were used to estimate hospitalizations among the Canadian-born population. Using hierarchical deterministic matching, about 4.6 million long-form respondents (excluding Quebec) were linked to the DAD for the three fiscal years from 2006/2007 through 2008/2009, based on birthdate, sex, and residential postal code. Validation concluded that the linked file is suitable for health-related research.[19]

Each linkage was approved by Statistics Canada's Executive Management Board.[22] Use of these linked data is governed by the *Directive on Record Linkage*.[23] Statistics Canada ensures respondent privacy during the linkage and subsequent use of linked files. Only employees directly involved in the process have access to the unique identifying information (such as names and sex) required for linkage and do *not* access health-related information. When linkage is complete, an analytical file is created from which identifying information has been removed. The present analysis used this de-identified file.

Study cohorts

This study is based on two cohorts representing the immigrant and Canadian-born populations. The *immigrant cohort* was created from the linked ILF-DAD data. Inclusion criteria were all EPCAs aged 25 to 74 residing outside of Quebec at the time of the 2006 Census. The cohort was composed of 507,405 ECPAs, of whom 54,445 were linked to hospital discharges during the three years of follow-up.

The *Canadian-born cohort* was created from the linked Census-DAD data. Inclusion criteria were all Canadian-born individuals aged 25 to 74 residing outside of Quebec. The cohort was based on a weighted population of 10,031,000 derived from the sample of 2,063,100 records, of which 517,350 were linked to hospital discharges during the three years of follow-up.

Variables

ECPAs were divided into skilled workers, business class immigrants, and live-in caregivers. A small number who had been nominated for admission by provinces under a new stream (provincial nominee program) were grouped with skilled workers.

Canada has long recruited temporary foreign workers for domestic employment.[10,24] On April 27, 1992, the Foreign Domestic Workers Program was replaced by the Live-in Caregiver Program. In the overall analysis, the term "live-in caregiver" includes those who arrived under the Foreign Domestic Workers Program. To differentiate between the two groups, landing year was categorized as arrival before 1993 or not. Because the vast majority of live-in caregivers are women, male live-in caregivers were not included in the detailed analysis.

Education was defined as having at least a bachelor's degree (university graduation) versus less at the time of application. Official language proficiency was reported knowledge of English and/or French at the time of application. World regions were: Caribbean, Central and South America, Western Europe, Eastern Europe, Southwest Asia and Africa, South Asia, Southeast Asia, East Asia, and other (including the United States and Oceania).[1]

Based on the distribution of ECPAs by sex and subcategory, age was grouped as: 25 to 44, 45 to 54, and 55 to 74.

Statistical methods

Descriptive statistics were used to profile ECPAs by subcategory. The primary outcome was at least one inpatient acute care hospital discharge during the period from April 1, 2006 through March 31, 2009. Age-standardized hospitalization rates (ASHRs) were annualized and derived for all causes (excluding pregnancy) and for the leading causes, based on the most responsible diagnosis as defined by the International Classification of Diseases Version 10.[25] The leading causes were circulatory diseases (I00 to I93), digestive diseases (K00 to K93), and cancer (C00 to D48). The Canadian-born population was used as the reference for age-standardization and as the reference category for ASHR comparisons.

Statistical testing for differences in ASHRs was conducted using logarithmic transformation to adjust for the skewness in the distribution of the standardized rates in analysis of rare events.[26] Logistic regression was used to derive sex-specific age-adjusted and

fully adjusted odds ratios for overall and cause-specific hospitalizations by ECPA subcategory, with skilled workers as the reference category. The covariates in the fully adjusted model were education, official language proficiency,[27] and world region.[1,2] To isolate differences between the female live-in caregiver and foreign domestic worker populations, logistic regression analyses were conducted by landing cohort.

Results

Description of cohorts

The distributions of male and female ECPAs by subcategory differed. Most (88%) male ECPAs aged 25 to 74 were skilled workers. Another 12% were business immigrants; very few (0.3%) were live-in caregivers (Table 1).

Similarly, among female ECPAs, the majority (69%) were skilled workers, but more than a quarter (27%) were live-in caregivers. The remaining 4% were business class immigrants.

Except for business class immigrants (half of whom were aged 55 to 74), ECPAs tended to be younger than the Canadian-born population.

The percentage of ECPAs who were university graduates (bachelor's degree or more) was highest among skilled workers—73% of men and 66% of women. As well, the percentages of business class immigrants and live-in caregivers with university degrees (36% to 42%) exceeded the figure for the Canadian-born population (about 20%).

Official language proficiency was highest among live-in caregivers, about 95% of whom reported knowledge of English and/or French. More than 80% of skilled workers reported knowing English and/or French; the percentage for business class immigrants was about 50%.

For male ECPAs, the leading world regions were East Asia (31%), South Asia (19%) and Southwest Asia and Africa (13%). The leading world regions for female ECPAs were Southeast Asia (31%), East Asia (25%) and Eastern Europe (10%). The first-place rank of Southeast Asia was due to live-in caregivers from the Philippines.

The majority of ECPAs landed after 1992 (71% and 66% of men and and women, respectively).

Table 1
Selected characteristics of economic class principal applicants in linked Immigrant Landing File-Discharge Abstract Database and Canadian-born in linked 2006 Census-Discharge Abstract Database, by sex, population aged 25 to 74, Canada excluding Quebec and territories

	Men					Women				
	Economic class principal applicants				Canadian-born	Economic class principal applicants				Canadian-born
Characteristics	Total	Skilled workers	Business class	Live-in caregivers	Total	Total	Skilled workers	Business class	Live-in caregivers	Total
Total										
Number	337,725	296,025	40,595	1,105	4,917,820	169,680	116,700	7,085	45,600	5,113,155
%	100.0	87.7	12.0	0.3	...	100.0	68.8	4.2	26.9	...
Age (mean)	45.9	44.8	54.4	43.6	46.2	44.4	43.9	51.8	44.4	46.4
	% distribution									
Age group										
25 to 44	46.8	51.3	13.2	55.8	46.8	52.2	54.0	19.4	52.5	46.4
45 to 54	34.6	34.1	37.7	31.1	25.8	35.1	34.2	43.9	35.9	25.7
55 to 74	18.7	14.5	49.1	13.1	27.4	12.8	11.7	36.7	11.6	27.9
World region										
Caribbean/Central and South America	5.2	5.7	1.3	6.2	...	9.5	9.8	1.5	9.9	...
Western Europe	11.0	10.7	13.2	3.7	...	8.2	7.8	8.5	9.2	...
Eastern Europe	12.2	13.7	1.9	5.2	...	10.4	13.9	2.3	2.6	...
Southwest Asia and Africa	12.5	12.8	10.8	3.4	...	7.2	9.9	4.5	0.9	...
South Asia	19.1	20.8	6.6	5.3	...	6.6	9.0	1.8	1.1	...
Southeast Asia	7.2	7.6	2.5	69.9	...	31.3	16.3	3.4	74.1	...
East Asia	30.9	26.8	62.1	4.7	...	24.6	30.6	75.2	1.2	...
Other (United States, Oceania, other)	1.9	2.0	1.6	1.5	...	2.3	2.8	2.9	1.0	...
Landing year										
1980 to 1992	28.8	27.8	35.7	31.7	...	33.9	32.6	30.3	37.8	...
1993 to 2006	71.3	72.2	64.3	68.3	...	66.1	67.4	69.7	62.2	...
University graduation	69.1	73.2	39.5	41.6	18.9	56.9	65.7	35.8	37.7	20.3
Langauge proficiency										
English and/or French	79.1	82.8	51.6	94.5	99.9	86.7	84.3	46.7	99.0	99.9
None	20.9	17.2	48.4	5.5	0.1	13.3	15.7	53.4	1.0	

... not applicable

Note: Live-in caregivers include those in the Foreign Domestic Workers Program before 1992.

Sources: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009); 2006 Census linked to Discharge Abstract Database (2006/2007 through 2008/2009).

ASHR lower than Canadian-born

The all-cause ASHR of male ECPAs was less than half that of Canadian-born men (301 versus 665 per 10,000) (Table 2). This pattern prevailed among skilled workers and business class immigrants, and for circulatory diseases and digestive diseases.

Among female ECPAs, the all-cause (excluding pregnancy) ASHR was significantly lower than that of Canadian-born women (310 versus 668 per 10,000). Again, the differences were significant for each ECPA subcategory and cause of hospitalization.

The rank order of the leading causes of hospitalization was the same among male ECPAs and Canadian-born men: circulatory diseases followed by digestive diseases. However, for female ECPAs, cancer ranked first, followed by digestive diseases, whereas for Canadian-born women, digestive diseases ranked first, followed by cancer.

Differences between subcategories

Among male ECPAs, business class immigrants were significantly less likely

Table 2
All-cause and leading cause crude and age-standardized† hospitalization rates (ASHRs) per 10,000 population aged 25 to 74, by sex, economic class principal applicants (ECPAs) and Canadian-born population, Canada excluding Quebec and territories, 2006/2007 through 2008/2009

Origin, sex and ECPA category	All-cause				Circulatory diseases				Digestive diseases			
			95% confidence interval				95% confidence interval				95% confidence interval	
Men	Crude	ASHR	from	to	Crude	ASHR	from	to	Crude	ASHR	from	to
Canadian-born‡	665.2	665.2	663.9	666.5	134.3	134.3	133.7	134.9	93.6	93.6	93.1	94.1
Total economic class	268.6	301.2*	297.5	305.0	59.1	67.4*	65.6	69.2	45.1	48.3*	46.8	49.7
Skilled workers	253.2	309.4*	305.0	313.8	55.1	70.1*	68.0	72.3	43.5	48.7*	47.1	50.4
Business class	381.1	282.0*	271.4	292.9	88.0	57.3*	53.4	61.6	57.5	45.1*	40.8	49.9
	All-cause (excluding pregnancy)				Cancer				Digestive diseases			
			95% confidence interval				95% confidence interval				95% confidence interval	
Women	Crude	ASHR	from	to	Crude	ASHR	from	to	Crude	ASHR	from	to
Canadian-born‡	668.0	668.0	666.7	669.3	75.0	75.0	74.5	75.4	92.4	92.4	91.9	92.9
Total economic class	275.1	310.0*	304.3	315.8	65.8	68.0*	65.5	70.6	34.2	38.2*	36.2	40.3
Skilled workers	268.6	278.3*	272.6	284.2	65.6	65.1*	62.5	67.9	32.3	33.1*	31.1	35.1
Business class	255.9	225.2*	200.1	253.4	63.0	59.1*	46.7	74.8	32.9	29.4*	21.1	40.8
Live-in caregivers	294.6	303.5*	293.9	313.3	66.9	65.7*	61.4	70.2	39.3	40.6*	37.2	44.3

* significantly different from reference category ($p < 0.05$)
† standardized to 2006 Census population aged 25 to 74
‡ reference category
Note: Live-in caregivers include those in the Foreign Domestic Workers Program before 1992.
Sources: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009); 2006 Census linked to Discharge Abstract Database (2006/2007 through 2008/2009).

Table 3
Adjusted odds ratios relating category of economic class principal applicants (ECPAs) aged 25 to 74 to hospitalization, by sex, all-cause and leading causes, Canada excluding Quebec and territories, 2006/2007 through 2008/2009

Sex and ECPA category	All-cause				Circulatory diseases				Digestive diseases			
		95% confidence interval				95% confidence interval				95% confidence interval		
Men	Age-adjusted	from	to	Fully† adjusted	from	to	Age-adjusted	from	to	Fully† adjusted	from	to	Age-adjusted	from	to	Fully† adjusted	from	to
Skilled workers‡	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Business class	0.86*	0.82	0.90	1.01	0.97	1.06	0.80*	0.74	0.87	1.05	0.96	1.14	0.90*	0.82	0.99	1.03	0.94	1.14
	All-cause (excluding pregnancy)				Cancer				Digestive diseases			
		95% confidence interval				95% confidence interval				95% confidence interval		
Women	Age-adjusted	from	to	Fully† adjusted	from	to	Age-adjusted	from	to	Fully† adjusted	from	to	Age-adjusted	from	to	Fully† adjusted	from	to
Skilled workers‡	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Business class	0.75*	0.68	0.84	0.88*	0.79	0.98	0.85	0.71	1.03	0.97	0.79	1.17	0.75*	0.57	0.99	0.85	0.64	1.14
Live-in caregivers	1.10*	1.05	1.15	1.04	0.98	1.10	1.02	0.94	1.10	0.92	0.83	1.02	1.27*	1.13	1.42	1.22*	1.05	1.40

... not applicable
* significantly different from reference category ($p < 0.05$)
† adjusted for age, education, official language proficiency, world region
‡ reference category
Note: Live-in caregivers include those in the Foreign Domestic Workers Program before 1992.
Source: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009).

than skilled workers to be hospitalized (OR = 0.86, 95% CI = 0.82 to 0.90) (Table 3). Patterns were similar for circulatory disease and digestive disease hospitalizations, but when education, official language proficiency and world region were taken into account, differences between the two subcategories were no longer statistically significant.

Among female ECPAs, business class immigrants had significantly lower odds of all-cause hospitalization than did skilled workers (OR = 0.75, 95% CI = 0.68 to 0.84), while live-in caregivers had significantly higher odds (OR = 1.10, 95% CI = 1.05 to 1.11). Results were similar for digestive disease hospitalizations, but not for cancer, where no significant difference was found among the ECPA subcategories. When the models were fully adjusted, female business class immigrants continued to have lower odds of all-cause hospitalization than did skilled workers, but the odds for live-in caregivers were no longer statistically different. However, for digestive diseases, significantly higher odds of hospitalization among live-in caregivers persisted (OR = 1.22, 95% CI = 1.05 to 1.40).

Live-in caregivers

An analysis of ASHRs for female ECPAs by landing cohort indicates the influence of replacement of the Foreign Domestic Workers Program by the Live-in Caregiver Program in 1992 (Table 4). The odds of all-cause hospitalization for women who entered Canada under the Foreign Domestic Workers Program were not significantly different from the odds for female skilled workers who arrived in that period (OR = 1.03, 95% CI = 0.96 to 1.10), regardless of education, official language proficiency, and world region. This was also true for cancer hospitalizations. However, for digestive diseases, full adjustment resulted in marginally higher odds of hospitalization among Foreign Domestic Workers (OR = 1.24, 95% CI = 1.01 to 1.51).

Women who arrived after 1992 under the Live-in Caregivers Program had significantly higher odds of all-cause hospitalization and hospitalization for digestive diseases than did female skilled workers. When education, official language proficiency and world region were taken into account, the odds were no longer significantly different.

Discussion

This is the first national study to examine hospitalization rates of economic immigrants by subcategory. Compared with the Canadian-born population aged 25 to 74, ECPAs had a low rate of hospitalization, although differences emerged between subcategories. Adjustment for education, official language proficiency and world region had differential impacts on the results—an indication of the importance of taking these factors into account.

The low hospitalization rates among ECPAs relative to the Canadian-born population are consistent with the "healthy immigrant effect." The tendency for immigrants, especially new arrivals, to be healthier may be due to self-selection and to medical screening.[1,11] As well, the employability (or economic contribution) requirement for ECPAs may play a role, with the "healthy worker effect"[28] enhancing the healthy immigrant effect. To disentangle the healthy worker and healthy immigrant effects, further analysis might compare ECPAs and a Canadian-born subpopulation with similar employability.

Table 4
Adjusted odds ratios relating category of female economic class principal applicants (ECPAs) aged 25 to 74 to hospitalization, by landing year, all-cause and leading causes, Canada excluding Quebec and territories, 2006/2007 through 2008/2009

	All-cause (excluding pregnancy)						Cancer						Digestive diseaes					
		95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval			95% confidence interval	
Landing year and ECPA category	Age-adjusted	from	to	Fully[†] adjusted	from	to	Age-adjusted	from	to	Fully[†] adjusted	from	to	Age-adjusted	from	to	Fully[†] adjusted	from	to
Landing years 1980 to 1992																		
Skilled workers[‡]	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Business	0.77*	0.65	0.92	0.91	0.76	1.08	0.98	0.72	1.32	1.01	0.74	1.38	0.75	0.48	1.18	0.85	0.54	1.35
Foreign domestic workers	1.03	0.96	1.10	1.02	0.94	1.10	0.95	0.84	1.07	0.98	0.85	1.14	1.17	0.99	1.39	1.24*	1.01	1.51
Landing years 1993 to 2006																		
Skilled workers[‡]	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...	1.00	...	...
Business	0.79*	0.69	0.91	0.90	0.78	1.04	0.82	0.64	1.04	0.96	0.74	1.25	0.82	0.57	1.18	0.88	0.60	1.29
Live-in caregivers	1.13*	1.06	1.20	1.06	0.98	1.15	1.03	0.92	1.15	0.87	0.74	1.02	1.34*	1.16	1.56	1.17	0.94	1.46

... not applicable
* significantly different from reference category ($p < 0.05$)
[†] adjusted for age, education, official language proficiency, world region
[‡] reference category
Source: Immigrant Landing File (1980 through 2006) linked to Discharge Abstract Database (2006/2007 through 2008/2009).

The rank order of leading causes of hospitalization was the same for male ECPAs and Canadian-born men. By contrast, for female ECPAs, cancer ranked first and digestive diseases second, whereas the order was reversed among Canadian-born women. An earlier study based on the same linked data showed that female ECPAs had higher cancer-related ASHRs than did their family class and refugee counterparts.[21] That study also reported higher ASHRs for cancer than for digestive diseases among recent female immigrants from Asia, Eastern Europe, and the Caribbean. The present analysis found a high ASHR for cancer among female ECPAs, not only for live-in caregivers, but also for skilled workers and business class immigrants, many of whom were from East Asia, a group with somewhat higher cancer mortality among recent immigrants.[1]

A number of studies have reported that immigrants may not receive necessary health care because of linguistic, cultural and other barriers.[29-31] Live-in caregivers may experience more of these barriers.[10,12-14,32-35] Also, according to the Immigration Refugee Protection Regulations of 2002, live-in caregivers who applied for immigration were exempt from the medical examination requirement, as they would have undergone a previous examination when applying for temporary residency.[36] The present analysis showed that, compared with skilled workers, live-in caregivers had higher age-adjusted odds of hospitalization overall and for digestive diseases, but adjustment for education, official language proficiency and world region yielded odds that were not significantly different. This suggests that the differences may be related to their origins in countries where digestive diseases are more prevalent. Alternatively, the possibility of gene-environment interactions for some digestive diseases has been suggested.[37,38] Further study could control for the fact that, owing to their temporary worker status before immigration, live-in caregivers tended to have been in Canada longer than their skilled worker and business class counterparts. Therefore, at least for those who immigrated after 2002, medical examinations were conducted more than two years earlier than those of other ECPAs.

Strengths and limitations

The major strength of this analysis is the use of linked data from the Immigrant Landing File and the Discharge Abstract Database. This linkage makes it possible to examine hospitalization rates among subcategories of ECPAs by leading causes, and compare these rates with those for the Canadian-born.

A limitation of the analysis is the inability to track subsequent emigration. Immigrants are more likely than the Canadian-born population to leave the country for extended periods; this may be especially true for business class immigrants.[39] The linkage approach ensured that ECPAs were in Canada on Census Day (May 16 2006), but it is not known if they remained in Canada throughout the follow-up period (2006/2007 to 2008/2009). To the extent that ECPAs had a greater likelihood of being out of the country, their ASHRs will be underestimated.

Another limitation is the lack of hospital data from Quebec, which meant that immigrants residing in that province were excluded.

Conclusion

This study demonstrates the feasibility of using linked ILF-DAD data to examine patterns of hospitalization among immigrant subgroups. As Canada continues to meet labour market needs through immigration, there is a need to determine health outcomes for immigrants and to compare them with the Canadian-born population.

Recent policy changes have affected the admission of economic class immigrants. For instance, the provincial nominee program, which complements the Federal Skilled Worker Program, has grown, and the live-in requirement for caregivers was removed.[40] As well, temporary foreign workers and foreign graduates with qualifying Canadian work experience can apply to become economic immigrants under the Canadian Experience Class.[41] The impact of such developments on health care utilization requires additional research.

What is already known on this subject?

- Differences in health outcomes of immigrants to Canada vary by origin and by period of arrival.
- Studies of variations in health by immigrant category typically focus on the three major classes—family class, refugees, and economic class.
- Relatively little attention has been paid to economic class immigrants, although they constitute the majority of recent arrivals (55% in 2006).

What does this study add?

- The analysis used two population-based linked databases to estimate age-standardized hospitalization rates (ASHRs) overall and for leading causes among economic class principal applicant (ECPA) subcategories, by sex, compared with their Canadian-born counterparts.
- ECPAs of both sexes had significantly lower all-cause ASHRs than did the Canadian-born population.
- This pattern prevailed for each ECPA subcategory and for each disease examined.
- Differences were apparent between ECPA subcategories—compared with skilled workers, business class immigrants had lower odds of hospitalization; live-in caregivers who arrived after 1992 had higher odds.
- Adjustment for education, official language proficiency, and world region reduced the strength of or eliminated these associations.

References

1. Ng E, Longitudinal Health and Administrative Data Research Team. *Insights into the Healthy Immigrant Effect: Mortality by Period of Immigration and Birthplace*. Health Analysis Division Working Paper No. 8 (Catalogue 82-622) Ottawa: Statistics Canada, 2011.
2. Rotermann M. The impact of considering birthplace in analyses of immigrant health. *Health Reports* 2011; 22(4): 37-43.
3. Saunders NR, To T, Parkin PC, Guttmann A. Emergency department revisits by urban immigrant children in Canada: A population-based cohort study. *Journal of Pediatrics* 2016; 170: 218-26.
4. Durbin A, Lin E, Moineddin R, et al. Use of mental health care for nonpsychotic conditions by immigrants in different admission classes and by refugees in Ontario, Canada. *Open Medicine* 2014; 8(4): e136-46.
5. Citizenship and Immigration Canada. *Evaluation of the Federal Skilled Worker Program*. Ottawa: Citizenship and Immigration Canada, 2010.
6. DesMeules M, Gold J, McDermott S, et al. Disparities in mortality patterns among Canadian immigrants and refugees, 1980-1998: Results of a national cohort study. *Journal of Immigrant Health* 2005; 7: 221-32.
7. McDermott, S, DesMeules M, Lewis R, et al. Cancer incidence among Canadian immigrants, 1980-1998: Results from a National Cohort Study. *Journal of Immigrant and Minority Health* 2011; 13(1): 15-26.
8. Immigration, Refugees and Citizenship Canada. *Facts and Figures 2014 – Immigration Overview: Permanent Residents*. Available at: http://www.cic.gc.ca/english/resources/statistics/facts2014/permanent/03.asp . Accessed April 16, 2016.
9. Kliewer EV, Kazanjian A. *Health Status and Medical Services Utilization of Recent Immigrants to Manitoba and British Columbia: A Pilot Study*. Vancouver: British Columbia Office of Health Technology Assessment, 2000.
10. Spitzer D, Torres S. *Gender-Based Barriers to Settlement and Integration for Live-In-Caregivers: A Review of the Literature*. Centre of Excellence for Research on Immigration and Settlement (CERIS) Working Paper No 71. Toronto: CERIS, 2008.
11. Hyman I. *Immigration and Health: Reviewing Evidence of the Healthy Immigrant Effect in Canada*. Centre of Excellence for Research on Immigration and Settlement (CERIS) Working Paper No. 55. Toronto: CERIS, 2007.
12. Spitzer DL. Work, worries and weariness: Towards an embodied and engendered migrant health. In: Spitzer DL, ed. *Engendering Migrant Health: Canadian Perspectives*. Toronto: University of Toronto Press, 2011.
13. Stewart M, Neufeld A, Harrison M, et al. Immigrant women family caregivers in Canada: Implications for policies and programs in health and social sectors. *Health and Social Care in the Community* 2006; 14(4): 329-40.
14. Kelly PF, Astorga-Garcia M, Esguerra EF, Community Alliance for Social Justice. *Explaining the Deprofessionalized Filipino: Why Filipino Immigrants Get Low-Paying Jobs in Toronto*. Centre of Excellence for Research on Immigration and Settlement (CERIS) Working Paper No. 75. Toronto: CERIS, 2009.
15. Canadian Institute for Health Information. *National Health Expenditure Trends, 1975 to 2015*. Ottawa: Canadian Institute for Health Information, 2015.
16. Statistics Canada. *Longitudinal Immigration Database (IMDB)*. Last updated December 4, 2015. Available at: http://www23.statcan.gc.ca/imdb-bmdi/internal/p2SV.pl?Function=getSurvey&SDDS=5057&dis=1. Accessed March 30, 2016.
17. Canadian Institute for Health Information. *Discharge Abstract Database (DAD) Metadata*. Available at: http://secure.cihi.ca/cihi-ext-portal/internet/en/document/types+of+care/hospital+care/acute+care/dad_metadata
18. Household Survey Methods Division. *CIC Landing File to Census 2006 Linkage*. Internal document. Ottawa: Household Survey Methods Division, Statistics Canada, 2011.
19. Rotermann M, Sanmartin C, Trudeau R, St-Jean H. Linking 2006 Census and hospital data in Canada. *Health Reports* 2015; 26(10): 10-20.
20. Sanmartin C, Ng E, Brennan J, et al. *Linking the Canadian Immigrant Landing File to Hospital Data: A New Data Resource for Immigrant Health*. Analytical Studies: Methods and References. Number 2 (Catalogue 11-633-X) Ottawa: Statistics Canada, 2016.
21. Ng E, Sanmartin C, Manuel DG. Acute care hospitalization, by immigrant category: Linking hospital data and the Immigrant Landing File in Canada. *Health Reports* 2016; 27(8): 12-8.
22. Statistics Canada. *Approved Record Linkages*. Available at: http://www.statcan.gc.ca/record-enregistrement/summ-somm-eng.htm
23. Statistics Canada. *Directive on Record Linkage*. Available at: http://www.statcan.gc.ca/record-enregistrement/policy4-1-politique4-1-eng.htm
24. Hsiung PC, Nichol K. Policies on and experience of foreign domestic workers in Canada. *Sociology Compass* 2010; 4(9): 766-78.
25. World Health Organization. *International Statistical Classification of Diseases*. Geneva: World Health Organization, 2010.
26. Carriere KC, Roos LL. A method of comparison for standardized rates of low-incidence events. *Medical Care* 1997; 35(1): 57-69.
27. Ng E, Pottie K, Spitzer D. Official language proficiency and self-reported health among immigrants to Canada. *Health Reports* 2011; 22(4): 1-10.
28. Li CY, Sung FC. A review of the healthy worker effect in occupational epidemiology. *Occupational Medicine* 1999; 49(4): 225-9.
29. Beiser M. The health of immigrants and refugees in Canada. *Canadian Journal of Public Health* 2005; 96(Suppl 2): S30-44.
30. Newbold B. Health status and health care of immigrants in Canada: a longitudinal analysis. *Journal of Health Services Research and Policy* 2005; 10(2): 77-83.
31. Lai DW, Chau SBY. Predictors of health service barriers for older Chinese immigrants in Canada. *Health and Social Work* 2007; 32(1): 57-65.
32. Bourgeault IL, Parpia R, Atanackovic J. Canada's Live-In Caregiver Program: Is it an answer to the growing demand for elderly care? *Journal of Population Ageing* 2010; 3(1-2): 83-102.
33. Tungohan E, Banerjee R, Cleto P, et al. Impediments to belonging: Economic precariousness during and after the Live-in Caregiver Program. *Canadian Ethnic Studies* 2015; 47(1): 87-105.
34. Salami B, Nelson S. The downward occupational mobility of internationally educated nurses to domestic workers. *Nursing Inquiry* 2014; 21(2): 153-61.
35. Brickner RK, Straehle C. The missing link: Gender, immigration policy and the Live-in Caregiver Program in Canada. *Policy and Society* 2010; 29 (4): 309-20.
36. Department of Justice. *Exemptions of Medical Examination Requirements*. Available at: http://laws-lois.justice.gc.ca/eng/regulations/SOR-2002-227/page-8.html#h-18. Accessed November 29, 2016.

37. Goh K, SD Xiao. Inflammatory bowel disease: A survey of the epidemiology in Asia. *Journal of Digestive Diseases* 2009; 10(1): 1-6.

38. Benchimol EI, Mack DR, Guttmann A, et al. Inflammatory bowel disease in immigrants to Canada and their children: A population-based cohort study. *American Journal of Gastroenterology* 2015; 110(4): 553-63.

39. Aydemir A, Robinson C. *Return and Onward Migration among Working Age Men*. Analytical Studies Branch Research Series (Catalogue 11F0019MIE2006273) Ottawa: Statistics Canada, 2006.

40. Immigration, Refugees and Citizenship Canada. Changes to Canada's Caregiver Program took effect on November 30, 2014. Available at: http://www.cic.gc.ca/english/work/hire/caregiver.asp. Accessed November 4, 2015.

41. Immigration, Refugees and Citizenship CanadaCanadian Experience Class. Available at http://www.cic.gc.ca/english/resources/tools/perm/econ/cec/. Accessed January 18, 2017.